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09/992,059	11/21/2001	Jimmy Roehrig	5809.P001	4857

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EXAMINER

AZARIAN, SEYED H

ART UNIT PAPER NUMBER

2625

DATE MAILED: 04/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/992,059

Applicant(s)

ROEHRIG ET AL.

Examiner

Seyed Azarian

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 November 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 28-31 is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-27, are rejected under 35 U.S.C. 103(a) as being unpatentable over Nyul et al (U.S. patent 6,584,216) in view of Karssemeijer et al (U.S. patent 6,580,818).

Regarding claim 1, Nyul discloses a method of analyzing a medical images to use a CAD system to detect anatomical abnormalities obtained from one of a plurality of original sources, the method comprising:

normalizing each medical image such that each medical image conforms to a canonical contrast response curve for image analysis regardless of the original source of the image (column 6, lines 5-17, in the transformation, standard scale is computed by mapping (normalization), the landmarks determined from the standard histogram, the "intensity scale of pixels" refer to the range of intensity values in the image, the transformation result in a standardized scale for each protocol and body region, also column 5, lines 64 through column 6, line 17, code or training refer to the process of estimating the parameters necessary to determine the transformation for a particular protocol and body region are estimated from a given set of images, which are

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computed by mapping the landmarks determined from the histogram “normalizing” refer to the range of intensity for different tissues in computerized tomography).

However Nyul clearly discloses medical diagnostic system, but does not explicitly state “medical image to use a CAD system”. On the other hand Karssemeijer in same filed of diagnostic system teaches computer aided diagnostic (CAD), system for assisting in the identification of speculated lesions in mammograms (column 4, lines 54-64)).

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify Nyul diagnostic system according to the teaching of Karssemeijer because it provides diagnostic system to perform analysis of medical images obtained using a plurality of imaging mechanism, which can easily be implemented in an imaging device such as MRI.

Regarding claim 2, Nyul discloses a method the method of claim 1, wherein the medical image is in a DICOM format for flexibility in communication with devices (column 6, lines 43-54, the present invention can be incorporated as a DICM (Digital Image and Communication) value of interest).

Regarding claim 3, Nyul discloses the method of claim 2, further comprising: converting the medical image to a DICOM format (column 6, lines 44-57, DICOM value of interest “lookup table” refer to exchange and communication of images in a “standard format” and storing an intensity transformation, also column 2, lines 39-48, the parameters of the standard histogram, thereby minimizing or eliminating the human interaction).

Regarding claim 4, Nyul discloses the method of claim 1, further comprising: detecting what anatomical feature is represented by the image; and processing the image to detect

abnormalities in the anatomical feature, in accordance with a detection process for that anatomical feature (Fig. 12, column 5, lines 1-8, data set of a patient's brain with a large tumor (abnormalities) displayed at window).

Regarding claim 5, Nyul discloses the method of claim 4, wherein detecting what anatomical feature are represented uses a header present in a DICOM format of the image (column 6, lines 44-56, picture Archiving and communication system, the present method can be incorporated as a DICOM value).

Regarding claim 6, Nyul discloses the method of claim 1, further comprising: generating a new tone scale for the medical image for optimal visualization of abnormalities in dense anatomic regions (see claim 5, also column 6, lines 57-64, transform images permit predetermined display window setting and also facilitate image segmentation).

Regarding claim 8, Nyul discloses the apparatus of claim 7, further comprising: an image acquisition module to acquire a medical image in-from one of a plurality of source (Fig. 11, column 16, lines 19-30, plurality of images).

Regarding claim 9, Nyul discloses the apparatus of claim 8, wherein the image acquisition module is coupled to the image analysis system through a network (column 6, lines 44-56, refer to communication system).

Regarding claim 10, Nyul discloses the apparatus of claim 7, further comprising: a review station to allow medical personnel to review the medical image after analysis (column 6, lines 45-64, image can be automatically transformed by correct lookup table for viewing, the method can be built into the MR scanner, to automatically produce real time image with the standard scale).

Regarding claim 11, Nyul discloses the apparatus of claim 10, wherein the review station is coupled to the image analysis system through a network (column 6, lines 45-64, image can be automatically transformed by correct lookup table for viewing).

Regarding claim 12, Nyul discloses the apparatus of claim 1, wherein the review station comprises: a user interface permitting the reviewer to manipulate the contrast and windowing of the image (column 9, lines 29-42, refers to operator).

Regarding claim 13, Nyul discloses the apparatus of claim 7, further comprising: marker focus system to permit a reviewer to automatically move from marked location to marked location on the medical image (column 9, lines 29-56 refer to marking).

Regarding claim 14, Nyul discloses the apparatus of claim 7, further comprising: a system archive to store the medical images, including historical images of past procedure ((column 6, lines 44-56, picture archiving and communication).

Regarding claim 15, Nyul discloses the apparatus of claim 7, wherein the image analysis system further comprises a pre-processing module (see claim 12, also column 5, lines 64 through column 6, line 17).

Regarding claim 16, Nyul discloses the apparatus of claim 15, wherein the pre-processing module comprises a pixel size adjustor to adjust a number of pixels per square inch to a standard value (Fig. 1, column 4, lines 11-17, the image were obtained using the same protocol on the same scanner and their histogram after scaling to a "fix range").

Regarding claim 17, Nyul discloses the apparatus of claim 15, wherein the pre-processing module comprises segmentation logic to segment the medical image (column 6, lines 57-64, the

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transform images permit predetermined display window setting and also image segmentation.

The images can be automatically transformed or accompanied by the correct “lookup table”).

Regarding claim 19, Nyul discloses the apparatus of claim 18, wherein the post-processing module includes a tone scale generator to adjust a tone scale to optimize viewing of dense portion of medical image (see claim 1, also column 8, lines 50-64 additional parameters may vary, and are used to fine-tuning).

Regarding claim 24, Nyul discloses the system of claim 20, further comprising: a remote display to permit access to processed image via a network (column 2, lines 28-47, viewing station, also column 6, lines 44-56).

Regarding claim 25, Nyul discloses the system of claim 20, further comprising: a network coupled to the system, the network permitting a distribution of processing to multiple computing devices (see claim 1, also column 6, lines 57-64 DICOM).

Regarding claims 7, 18, 20, 22-23 and 26-27; it recites similar limitation as claims 1 and 12 are similarly analyzed.

Regarding claim 21, it recites similar limitation as claim 13 is similarly analyzed.

REASONS FOR ALLOWANCE

3. The following is an examiner’s statement of reasons for allowance.

The instant invention generally relates to analyzing a medical image obtained from one of a plurality of modalities, the method comprising normalizing the medical image to create a uniform display.

Claim 28, providing a system comprising: a source of image data, each image in the image data having one of a multiplicity of spatial resolutions and a multiplicity of contrast responses; a preprocessing module to transform the image data into "canonical" forms with uniform contrast response, overall level and pixel size; such that the image analyzed by a computer aided diagnosis system has a uniform contrast response regardless of the original source of the image.

The invention is novel due to image data having one of a multiplicity of spatial resolutions and a multiplicity of contrast responses; a preprocessing module to transform the image data into "canonical" forms with uniform contrast response.

The closest prior art of record (Nyul) teaches magnetic resonance imaging (MRI), image normalization, image display, and image processing. But do not suggest multiplicity of spatial resolutions and a multiplicity of contrast responses; a preprocessing module to transform the image data into "canonical" forms with uniform contrast response.

These key features in combination with the other features of the claimed invention are neither taught nor suggested by the art of record.

Claims 28-31 are allowed.

Other prior art cited

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. patent (5,873,824) to Doi et al is cited for apparatus and method for computerized analysis of interstitial infiltrates in chest images using artificial neural networks.

U.S. patent (5,586,160) to Mascio is cited for automated analysis for microcalcifications in high resolution digital mammograms.

U.S. patent (6,738,500) to Bankman et al method and system for detecting small structures in images.

U.S. patent (6,725,231) to Hu et al is cited for DICOM XML DTD/SCHEMA generator.

U.S. patent (6,434,262) to Wang is cited for computer-aided diagnosis system and method.

U.S. patent (5,790,690) to Doi et al is cited for computer-aided method for automated image feature analysis and diagnose of medical image.

Contact Information

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Seyed Azarian whose telephone number is (571) 272-7443. The examiner can normally be reached on Monday through Thursday from 6:00 a.m. to 7:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta, can be reached at (703) 308-5246. The fax phone number for the organization where this application or proceeding is assigned is 571-272-7453.

Information regarding the status of an application may be obtained from the Patent Application information Retrieval (PAIR) system. Status information for published application may be obtained from either Private PAIR or Public PAIR. Status information about the PAIR system, see [http:// pair-direct.uspto.gov](http://pair-direct.uspto.gov). Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Seyed Azarian
Patent Examiner
Group Art Unit 2625
April 17, 2005

